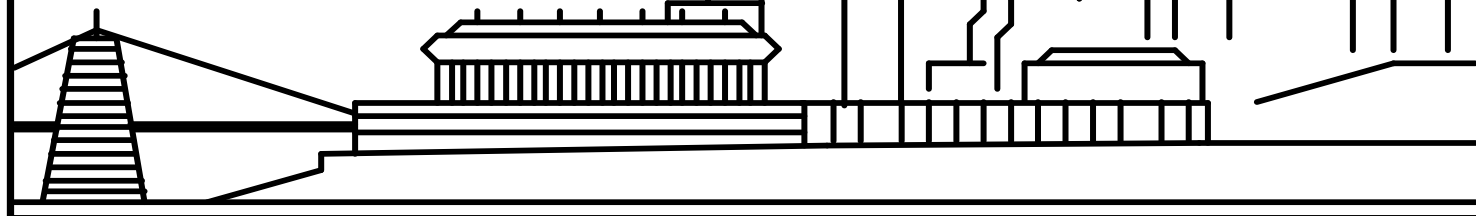




INSTITUTE OF
ELECTRICAL &
ELECTRONICS
ENGINEERS, INC.



SEPTEMBER 1996

IEEE CINCINNATI SECTION NEWSLETTER

SEPTEMBER MEETING

TOUR OF CINCINNATI WATER WORKS

DATE: THURSDAY, SEPTEMBER 26, 1996

PLACE :Cincinnati Water Works
5651 Kellogg Ave. (opposite California Golf Course)

TIME: 7:00 p.m. (Guard will tell you where to park)

Enter building with large flagpole. Tour is approximately 1 1/4 hours long.

Please call Dee Scott at
385-9446

by **Noon, Wednesday, September 25th** if you plan to attend.
(This is necessary to facilitate the tour guides.)

The tour will be hosted by Mr. Jack DeMarco, Superintendent of Water Quality and Treatment and William Reeves, Superintendent of Water Supply.

ABOUT THE TOUR: The September meeting will feature a guided tour of the 235 million gallon per day Richard Miller Water Treatment Complex. The treatment plant provides drinking water for 800,000 Greater Cincinnati Area customers. The complex includes several unique features, the most notable being the world famous Granular Activated Carbon Adsorption and On-site Reactivation System. Special attention will be provided to features of interest to electrical and electronic engineers.

DIRECTIONS: From Downtown, travel east on Fifth St. across Broadway then follow the I-471 signs. Take I-471 south across the bridge into Kentucky. Follow I-471 to I-275. Go east on I-275 across the bridge back into Ohio. Immediately after crossing the bridge, get off at the Kellogg Ave. exit. Turn left onto Kellogg Ave. and, a few blocks later, turn left into the Miller Plant entrance. While it seems complicated, it is only about a 15 minute drive. (See map on Page 7).

CHAIRMAN'S MESSAGE

by STEVE OLENICK

I hope all you had a great summer.

We are very close to offering the Section newsletter via E-mail. A recent query of the E-mail addresses within our database indicated that 2/3 of the respondents would prefer to get the newsletter via E-mail. For those of you who do not have E-mail, we do not plan to discontinue the mail service. We simply want to improve our distribution.

A waterworks tour is scheduled for Sept. and a wireless communications presentation is scheduled for October. We are planning to invite and welcome student members from the local universities at a dinner preceding the October meeting.

If you have any suggestions for technical meetings please contact me at 513-573-6555 or e-mail me at SOLENICK@CINELE.COM.

Until next time.

**TRANSISTORS AND
INTEGRATED CIRCUITS**
by R. J. Reiman, Historian

On December 23rd, 1947, a small band of scientists at Bell Telephone Laboratories in Murray Hill invented the transistor, one of the most important inventions of the twentieth century. Like the vacuum tube, the transistor could amplify current, detect radio waves, and serve as a switch. It was superior to the vacuum tube, since it turned on instantly, required little power to operate, did not burn out, was inexpensive to make, was highly resistant to vibration and shock, and was miniature in size. It had to be protected from voltage surges however. The transistor was the answer to the weakest link on the developing computers since it could replace the vacuum tube. Its first use was in hearing aids.

In 1906, Lee De Forest had invented the triode, and Edwin Armstrong had devised the circuits using the triode which led to radio. The rise of quantum mechanics gave scientists a theoretical tool for employing semiconductors in electronic circuits. Radar had been invented in the 1930s and semiconductors were tried as a detector of short-waves in spotting low flying aircraft.

Russell S. Ohl of Bell Labs in early 1940 had been astonished when a block of silicon, doped to create regions of positive and negative electrons, could generate half a volt of electricity when a light was shined on the dividing line between the positive and negative zones, i.e. the PN JUNCTION. William Shockley, John Bardeen and Walter Brattain were assembled as a team to research the semiconductor and their aim was to replace the telephone relay in switching stations. In December 1947, Bardeen and Brattain assembled a semiconductor of germanium with two pn junctions and achieved an amplification of 18. This device, the point-contact transistor, was followed by Shockley's bipolar or junction transistor which was easier to manufacture. Bell Labs introduced the point-contact transistor in 1948 and the junction transistor in 1950s. The transistor could be licensed in exchange for royalty and Bell Labs held a course in transistor technology. By 1953, hearing aids used the transistor and by 1954, radios. The first computers to use them appeared in 1957 and 1958 including UNIVAC. In May of 1952, an English engineer, G.W.A. Demmer, called for assembling transistors and associated components into circuits in a block as a means of improving reliability and in miniaturizing electronic devices. The Defense Department was conducting research to this same end for military service.

Robert Noyce, a California physicist, would gather a research team in Palo Alto funded by Fairchild Camera and Instrument Company of New York and the team would concentrate on silicon transistors and integrated circuits. Jack Kilby at Texas Instruments was also working on miniaturization and achieved a phase-shift oscillator which was miniature but not integrated into one solid block. In 1961, Fairchild and TI would introduce the first chips

performing Boolean operations such as OR and NOR gates. It would take more work to complete the transfer from tubes to chips for the computer.

A MESSAGE FROM YOUR PACE CHAIRMAN

"A Network of Professional Activities for Engineers"

Our last IEEE meeting in May was presented by Mr. George McClure, who is currently Chairman of the IEEE Career Policy Council and Chairman of the Individual Benefits and Services Committee (Financial Advantage Program) , was very beneficial to all of those who attended.

One of the things I would like to do for the 1997 year is to get more recognition to individuals in the Cincinnati Section for their professional and community activities. To do this we must immediately. My goal is to have one of our IEEE members receive an award at the Engineers and Scientists of Cincinnati annual meeting in February 1997. The awards which are presented are as follows:

- Distinguished Engineer of Cincinnati
- Distinguished Scientist of Cincinnati
- Young Engineer
- Young Scientist
- Professional Accomplishment
- Community Service

If you feel one of your colleagues you work with is eligible for any of these awards please call or write to me. With a membership of approximately 1000 engineers there must be a few who qualify for these awards.

Also, some of you may qualify for national IEEE awards. More on this in the next Newsletter.

Lastly, I'm arranging the September tour to the Cincinnati Water Works. The Superintendent of Water Quality and Treatment, Mr. Jack DeMarco is an acquaintance of mine and he will conduct an excellent tour and explanation of the facilities, so please plan to attend.

William J. Lohner
PACE Chairman
8703 Indianwoods Drive
Cincinnati, Ohio 45251
(513) 385-7268

THE SOUNDING ROCKET PROJECT AT UC NEEDS YOUR HELP!!!

College of Engineering students at the University of Cincinnati are involved in the development of a payload for a Sounding Rocket flight next year and they could use your help! The payload will be carrying science instruments to measure ozone and atmospheric winds. In addition it will evaluate composites for vehicle structures, and new telemetry and attitude control subsystems. The effort began in 1994 with initiation of the NASA Student Launch Program. Over the past two years the students have completed the design phase of the program and are ready to begin fabrication, assembly of the payload subsystems.

Volunteers are needed to assist in these efforts. If you ever wanted to get involved with a real flight project, this is your opportunity! Call Larry Cooper at the University of Cincinnati Space Engineering Center (513) 556-4043 for details.

AUTOTESTCON '96 IS COMING UP!!!

AUTOTESTCON '96, the Systems Readiness Technology Conference, will be held September 16-19 at the Dayton Convention Center in Dayton, Ohio. The theme of the 32nd annual Conference is "TEST TECHNOLOGY AND COMMERCIALIZATION - PAST, PRESENT AND FUTURE," which is especially relevant to today's acquisition reform environment.

The Seminars begin on Monday, the 16th and will include topics such as TPS Management, ABBET, Introduction to VXI, Using MMS-RF for ATE, Built-in Test, Diagnostic Assessment, and Artificial Intelligence in Test. Monday also features a golf outing at one of the premier courses in the Dayton area - the Golf Club at Yankee Trace.

The Technical Program (Tuesday through Thursday) features papers in 19 sessions encompassing four tracks: Government Applications & Standards; Process, Tools & Technology; Commercial & International Activities; and Integrated Systems & Diagnostics. A special session, hosted by the Department of Commerce, will offer presentations and answer questions about Global Business Opportunities in our declining defense environment.

Presentations are planned by these Invited Speakers:

Lawrence P. Farrell Jr., Lieutenant General, USAF, Vice Commander, Air Force Materiel Command;

John G. Coburn, Lieutenant General, US Army, Deputy Chief of Staff for Logistics, Pentagon;

Robert W. Smith, Rear Admiral, US Navy, Assistant Commander, Industrial Capabilities.

AUTOTESTCON has proven to be a very valuable forum in the exchange of requirements and technology for automatic testing and systems support. As the largest 3 day Automatic Test Equipment (ATE) Conference of the year, AUTOTESTCON '96 will: explore how to best utilize existing Automatic Test Systems; focus on the most promising, cost-effective new ATE approaches; spotlight the latest COTS prime hardware and test systems; examine the infusion of new technology from non-DoD sources; and discuss how to export effective DoD support solutions to domestic and international commercial markets.

In addition, exhibitor display areas, technical workshops, a luncheon program featuring prominent government and industry speakers and an outstanding social program are featured in the city best known as The Birthplace of Aviation.

Exhibit hours will be 10 a.m. to 5 p.m. with the Exhibitor Reception from 6 p.m. to 9 p.m. on Tuesday, 9 a.m. to 5 p.m. on Wednesday, and 9 a.m. to Noon on Thursday. For more information, please call Erwin Gangl at 513-476-3519 or visit us on the Web at: <http://www.primenet.com/~magpub>.

IEEE HOTLINES, JUNE 1996

IEEE-USA TESTIMONY URGES CREATION OF USEFUL-ARTICLE PROTECTION

Congress should enact a new type of intellectual-property right that would protect the innovators of fast moving technologies, according to IEEE-USA testimony on June 6 before the House Subcommittee on Technology.

"IEEE-USA would like to propose new intellectual property registration protection that would prevent others from copying the useful aspects of original articles," testified IEEE-USA Vice Chair David M. Ostfeld at a hearing on "The Patent System and Modern Technology Needs: Meeting the Challenges of the 21st Century."

Ostfeld maintained that the current patent system cannot respond quickly enough to adequately protect innovators of many new and rapidly changing technologies, such as circuit technology, artificial intelligence, databases, the exchange of information through high-speed global networks, and adaptive manufacturing. According to Ostfeld, these technologies typically have a useful life of 18-60 months, and are currently unprotected by the slower moving patent process. As a result, research and development investments -- often by very small companies -- are open to exploitation by predatory copiers throughout the world, he said.

"Useful-article registration would give inventors a base market here in the United States for three years," according to Ostfeld, "during which they could recoup their initial development costs." This protection, he said, would prevent others from copying the useful aspects of original articles that are not copyrightable but may be patentable. Registrants could also apply for a patent, but the registration would expire immediately when patent protection took effect.

Ostfeld asserted that useful-article registration would also reduce the cost and complexity of obtaining intellectual-property protection for small innovators. He proposed that prospective registrants would file a simple, copyright-type application that would reduce or eliminate the need for professional legal assistance. Registration would be awarded if the application appeared to comply with the information required -- with no need to search prior art, and would take effect at the filing date. Initial enforcement of article-protection rights would be provided by an administrative tribunal jointly appointed by the Commissioner of the U.S. Patent and Trademark Office, the Register of Copyrights, and the Court of Claims.

Noting that IEEE-USA has prepared model legislation on useful-article protection, Ostfeld told the subcommittee that "we look forward to working with you to provide innovators the type of timely intellectual-property protection that they seriously need and to improve the well-being of innovation in America while competing in a world market." Joining in the favorable response to the IEEE-USA proposal by the members present, Subcommittee Chair Rep. Connie Morella, R-Md., promised Ostfeld, "We will explore it in the subcommittee."

For a copy of the IEEE-USA testimony, contact Marilyn Sumpter at 202-785-0017, ext. 336, or download the document from IEEE-USA's Web site at URL < [www.ieee.org / usab / DOCUMENTS / FORUM / LIBRARY / PAPERS / patent.html](http://www.ieee.org/usab/DOCUMENTS/FORUM/LIBRARY/PAPERS/patent.html)> (case-sensitive).

IEEE-USA SYMPOSIUM CONSIDERS 'ROADMAP' FOR FUTURE FEDERAL TECH POLICY

Caught in the budget squeeze, government R&D programs have become the battleground for increasingly divergent visions of the proper federal role in technology policy. Several leading proponents of competing agendas investigated areas of common ground at the June 10 IEEE-USA Technology Policy Council Symposium in McLean, Va.

Recent budget battles have provoked sharp partisan disagreements between technology policy-makers in Congress. However, speeches by Rep. George Brown, D-Calif., ranking minority member of the House Science Committee, and Sen. Conrad Burns, R-Mont., chair of the Senate Commerce Subcommittee on Science, Technology and Space, recognized the complexity of R&D issues and that a balanced approach is required. Brown called for the right mix of direct cooperation and other incentives. He criticized the Republican plan to cut federal R&D spending by one third over the next seven years, but also questioned President Clinton's proposal for keeping the R&D budget high in the short term, while back-loading drastic cuts at the end of his

seven-year plan. Distinguishing the Democratic and Republican approaches as strategies of direct federal partnerships with industry vs. corporate tax incentives and deregulation, he declared that "neither extreme way will solve the problem."

Burns echoed Brown's plea for a direct federal role in R&D, acknowledging that "government can help and should." Drawing a "very fine line" between appropriate federal investment and full-fledged "industrial policy," Burns attributed the difficulty in sustaining federal R&D spending not to ideological differences, but to the fact that few are aware of technological development except in very dramatic cases. Members of Congress are beholden to their constituents, and "those of us involved in sci-tech have a hard time selling the American electorate unless there's a big breakthrough," he said.

Motorola Chairman Robert Galvin endorsed partnerships between government and industry, and concentrated on what the private sector could and should contribute to such cooperative efforts. He proposed that the federal R&D enterprise adopt the use of "roadmaps," which Galvin said were responsible for much of his company's and industry's success in recent years. One of the fruits of the industry consortium Sematech's use of roadmaps, according to Galvin, was the discovery that "private sector competitors have an ability and an inclination toward far greater cooperation with each other than has ever been appreciated in the past." What the federal government could provide, he explained, are "utilitarian processes to get us working together -- then the private sector will re-enter the R&D enterprise."

Representatives of present and past presidential administrations differed on the best form of government-industry cooperation. Skip Johns, associate director of technology in Clinton's Office of Science and Technology Policy, declared, "If you say there's no federal role to play in Team U.S.A., you better check your facts." According to Johns, the United States is lagging in several competitive measures, including non-defense R&D spending, real growth in business R&D expenditures and balance of trade. He argued for a vigorous federal technology policy, pointing to Taiwan as a successful model.

Dr. Robert M. White, head of Carnegie Mellon's Department of Electrical and Computer Engineering and former Commerce Dept. undersecretary for technology in the Bush administration, argued instead for a more diffuse federal role. White adopted a positive view of this country's current competitiveness, which he attributed in part to federal and private-sector initiatives undertaken during the past several years. "Our diversity of programs is what causes this process to congeal," he stated. "My concern is that the inputs to this process are declining by both government and industry, to the point where these cuts might affect the robustness of the innovative system," White concluded.

IEEE-USA BACKS TWO PENSION BILLS

IEEE-USA has endorsed two pending pension bills in the U.S. House and Senate.

The Senate version of the Small Business Job Protection Act was passed on July 9. H.R.3448 includes a number of tax breaks for small businesses, pension-simplification provisions, an expanded IRA for non-working spouses, and extensions of expiring tax provisions -- including the exclusion for employer-provided educational assistance and the Research and Experimentation Tax Credit. IEEE-USA's Engineering Employment Benefits Committee (EEBC) will support the Senate version of the bill in the upcoming conference committee.

IEEE-USA has also joined a coalition of engineering societies in endorsing H.R.3077, which would develop recommendations for the improvement of the nation's private pension system. The bill, sponsored by Rep. Nancy Johnson, R-Conn., and Rep. Earl Pomeroy, D-N.D., would create a bipartisan Congressional Commission to assess the adequacy of private retirement-savings programs and make recommendations for

improvements. Similar legislation will be introduced this summer in the Senate by Sen. Bill Bradley, D-N.J., and Sen. James Jeffords, R-Vt.

For more information about these and other benefits legislation, visit the EEBC's new Web site at URL [www.ieee.org/usab/DOCUMENTS/ FORUM / COMMITTEE/ eebc.html](http://www.ieee.org/usab/DOCUMENTS/FORUM/COMMITTEE/eebc.html) (case sensitive).

IEEE-USA WEB UPDATE: NEW INFORMATION ON EMPLOYMENT BENEFITS

IEEE-USA's Engineering Employment Benefits Committee (EEBC) has unveiled a new Web site offering comprehensive information on benefits issues as well as financial-planning advice. The site will support EEBC's objectives of enacting federal legislation to improve the portability of health and pension benefits, expanding individual opportunities to save for retirement, and increasing member awareness of important employment-benefits issues.

Members will find links to IEEE-USA benefits position papers, summaries of current federal legislation, information on IEEE-USA's exclusive retirement-planning software, and links to other sources of employment-benefits information. In addition, the site will link to EEBC's new Personal Finance Network, featuring up-to-the minute reports and analyses on pensions, retirement-savings and personal-finance matters of special concern to IEEE members. The on-line resource also includes text, graphics, audio and video information on current legislative, regulatory and legal developments and provides links to source documents, interactive tutorials and "cyber polls" on hot topics.

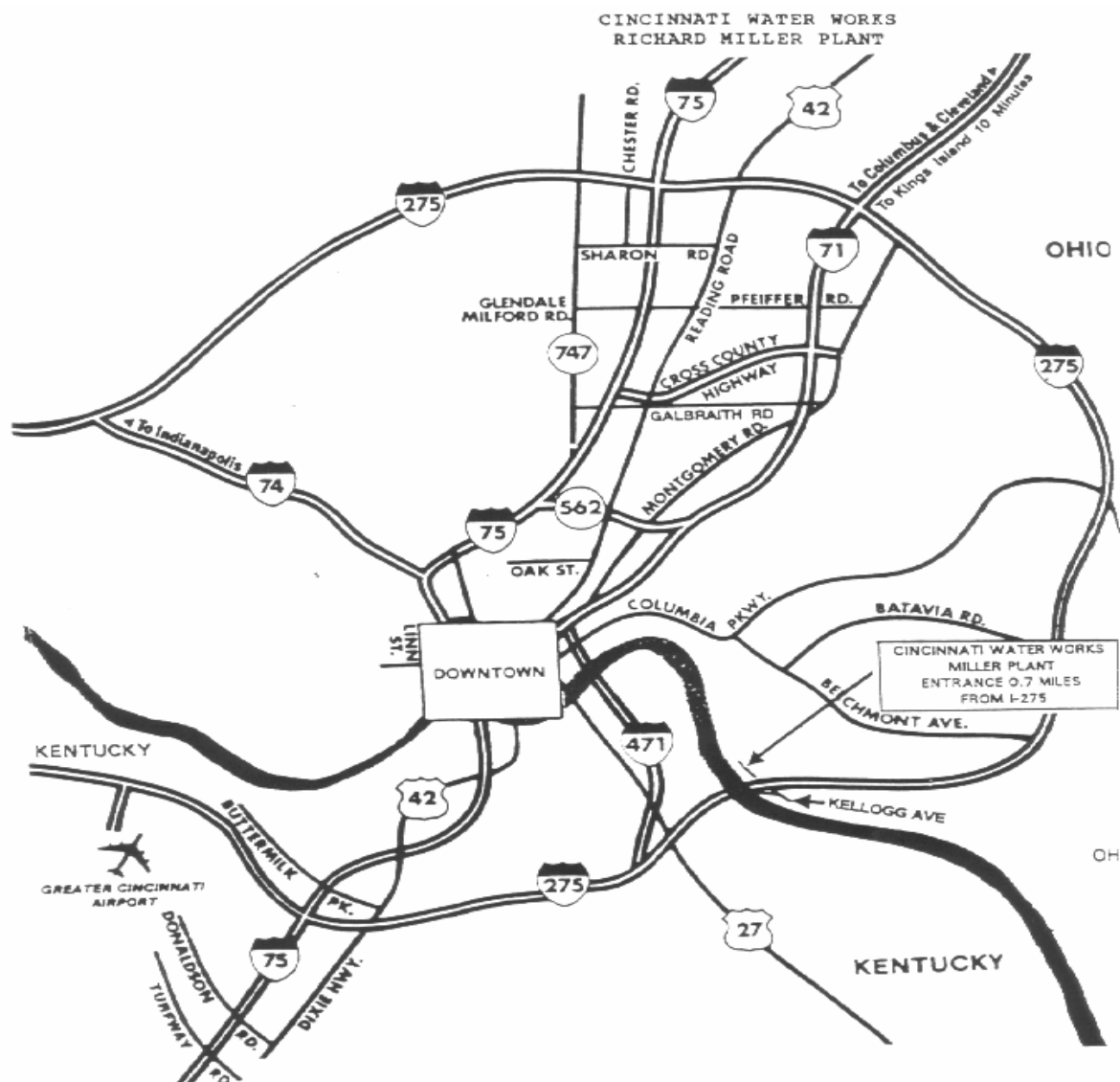
To access the EEBC home page, set your Web browser to URL [www.ieee.org/usab/ DOCUMENTS/ FORUM/COMMITTEE/eebc.html](http://www.ieee.org/usab/DOCUMENTS/FORUM/COMMITTEE/eebc.html) (case sensitive).

IEEE-USA IMPACT RECEIVES PUBLICATION EXCELLENCE AWARD

IMPACT, IEEE-USA's newsletter for volunteer leaders, received an annual award for publication excellence (APEX) in a nationwide competition sponsored this month by WRITING CONCEPTS:

THE BUSINESS COMMUNICATIONS REPORT. IMPACT was one of 834 newsletters competing in eight different categories and one of 33 letters recognized with an award of excellence in the "most-improved" category. APEX '96 drew nearly 4,100 entries. Judges included WRITING CONCEPTS' editor and publisher, consulting editor and senior evaluator.

IEEE-USA's newsletter is overseen by Robert T. Nash and William W. Middleton, volunteer editors, with staff support by Managing Editor Georgia C. Stelluto and Associate Editor Deborah M. Williams. IMPACT is celebrating its 20th year of publication, with Frank E. Lord -- IEEE-USA's current Communications Committee chair -- its founding editor in 1976.



Dee Scott (call for meeting reservations)	385-9446
Steve Olenick - Chairman	573-6555 (Office), Solenick@cinele.com (E-mail), 573-6514 (Fax)
Bob Haas - Vice Chairman	231-2584
Orest Melnyk - Treasurer	397-1242
Mark Reineck - Secretary	753-6290
Ron Harbaugh - Member-At-Large	352-6202
Eric Wright - Member-At-Large	881-3329
Jack Beckmeyer - Arrangements Chairman	353-2643, 353-2671 (Fax)
Bill Lohner - PACE Chairman	385-7268

Bob Morrison - Editor

287-3697 (Office), 287-3698 (Fax)

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**The Institute of Electrical and
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C/O Dee Scott
7780 Hackney Circle
Maineville, Ohio 45039